

## **AMENDMENTS TO THE CLAIMS**

This listing of claims will replace all prior versions, and listings, of claims in the application:

### **Listing of Claims:**

1           1. (Currently amended) A method for generating code to perform  
2   anticipatory prefetching for data references, comprising:  
3           receiving code to be executed on a computer system;  
4           analyzing the code to identify data references to be prefetched; and  
5           inserting prefetch instructions into a preceding basic block of the code in  
6   advance of the identified data references, wherein inserting prefetch instructions  
7   involves inserting multiple prefetch instructions for a given cache line, and  
8   wherein inserting the prefetch instructions involves,  
9           attempting to calculate a stride value for a given data  
10          reference within a loop,  
11          if the stride value cannot be calculated, setting the stride  
12          value to a default stride value, and  
13          inserting a prefetch instruction to prefetch the given data  
14          reference for a subsequent loop iteration based on the stride value;  
15          wherein the stride value is constant for some but not necessarily all loop  
16   iterations.

1           2. (Original) The method of claim 1, further comprising allowing a system  
2   user to specify the default stride value.

1           3. (Original) The method of claim 1, wherein calculating the stride value  
2 involves:  
3           identifying an induction variable for the stride value;  
4           identifying a stride function for the stride value; and  
5           calculating the stride value based upon the stride function and the  
6 induction variable.

1           4. (Original) The method of claim 1, wherein inserting the prefetch  
2 instruction based on the stride value involves:  
3           calculating a prefetch cover distance by dividing a cache line size by the  
4 stride value;  
5           calculating a prefetch ahead distance as a function of a prefetch latency,  
6 the prefetch cover distance and an execution time of a loop; and  
7           calculating a prefetch address by multiplying the stride value by the  
8 prefetch cover distance and the prefetch ahead distance and adding the result to an  
9 address accessed by the given data reference.

1           5. (Original) The method of claim 1, wherein analyzing the code involves:  
2           identifying loop bodies within the code; and  
3           identifying data references to be prefetched from within the loop bodies.

1           6. (Original) The method of claim 5, wherein analyzing the code to  
2 identify data references to be prefetched involves examining a pattern of data  
3 references over multiple loop iterations.

1           7. (Original) The method of claim 1, wherein analyzing the code involves  
2 analyzing the code within a compiler.

1           8. (Currently amended) A computer-readable storage medium storing  
2 instructions that when executed by a computer cause the computer to perform a  
3 method for generating code to perform anticipatory prefetching for data  
4 references, the method comprising:  
5           receiving code to be executed on a computer system;  
6           analyzing the code to identify data references to be prefetched; and  
7           inserting prefetch instructions into a preceding basic block of the code in  
8 advance of the identified data references, wherein inserting prefetch instructions  
9 involves inserting multiple prefetch instructions for a given cache line, and  
10 wherein inserting the prefetch instructions involves,  
11           attempting to calculate a stride value for a given data  
12           reference within a loop,  
13           if the stride value cannot be calculated, setting the stride  
14           value to a default stride value, and  
15           inserting a prefetch instruction to prefetch the given data  
16           reference for a subsequent loop iteration based on the stride value;  
17           wherein the stride value is constant for some but not necessarily all loop  
18 iterations.

1           9. (Original) The computer-readable storage medium of claim 8, wherein  
2 the method further comprises allowing a system user to specify the default stride  
3 value.

1           10. (Original) The computer-readable storage medium of claim 8, wherein  
2 calculating the stride value involves:  
3           identifying an induction variable for the stride value;  
4           identifying a stride function for the stride value; and

5           calculating the stride value based upon the stride function and the  
6   induction variable.

1           11. (Original) The computer-readable storage medium of claim 8, wherein  
2   inserting the prefetch instruction based on the stride value involves:

3           calculating a prefetch cover distance by dividing a cache line size by the  
4   stride value;

5           calculating a prefetch ahead distance as a function of a prefetch latency,  
6   the prefetch cover distance and an execution time of a loop; and

7           calculating a prefetch address by multiplying the stride value by the  
8   prefetch cover distance and the prefetch ahead distance and adding the result to an  
9   address accessed by the given data reference.

1           12. (Original) The computer-readable storage medium of claim 8, wherein  
2   analyzing the code involves analyzing the code within a compiler.

1           13. (Currently amended) An apparatus that generates code to perform  
2   anticipatory prefetching for data references, comprising:

3           a receiving mechanism that is configured to receive code to be executed on  
4   a computer system;

5           an analysis mechanism that is configured to analyze the code to identify  
6   data references to be prefetched; and

7           an insertion mechanism that is configured to insert prefetch instructions  
8   into a preceding basic block of the code in advance of the identified data  
9   references wherein the insertion mechanism facilitates inserting multiple prefetch  
10   instructions for a given cache line;

11          wherein the insertion mechanism is configured to,

12 attempt to calculate a stride value for a given data reference  
13 within a loop,  
14 set the stride value to a default stride value if the stride  
15 value cannot be calculated, and to  
16 insert a prefetch instruction to prefetch the given data  
17 reference for a subsequent loop iteration based on the stride value;  
18 wherein the stride value is constant for some but not necessarily all loop  
19 iterations.

1 14. (Original) The apparatus of claim 13, further comprising a  
2 configuration mechanism that is configured to receive the default stride value  
3 from a system user.

1 15. (Original) The apparatus of claim 13, wherein while calculating the  
2 stride value, the insertion mechanism is configured to:  
3 identify an induction variable for the stride value;  
4 identify a stride function for the stride value; and to  
5 calculate the stride value based upon the stride function and the induction  
6 variable.

1 16. (Original) The apparatus of claim 13, wherein the insertion mechanism  
2 is configured to:  
3 calculate a prefetch cover distance by dividing a cache line size by the  
4 stride value;  
5 calculate a prefetch ahead distance as a function of a prefetch latency, the  
6 prefetch cover distance and an execution time of a loop; and to

7            calculate a prefetch address by multiplying the stride value by the prefetch  
8   cover distance and the prefetch ahead distance and adding the result to an address  
9   accessed by the given data reference.

1            17. (Original) The apparatus of claim 13, wherein the apparatus resides  
2   within a compiler.

1            18-45 (Canceled).